

PATENT SPECIFICATION



DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Liquid Spraying Apparatus

We, ALLMAN PATENTS LIMITED, a Company organised under the laws of Great Britain, of "Elmstead", Birdham Road, Chichester, in the county of Sussex, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be described in and by the following statement:-

The invention relates to spraying apparatus such as apparatus for spraying insecticides, fungicides, selective weed killers and like liquids used in agriculture and horticulture. It also relates to apparatus for spraying acids and like corrosive liquids.

According to the present invention apparatus for spraying liquids provided with a pump comprises a guide for a flexible tube, which tube is successively squeezed between the guide and at least one of a plurality of spaced apart rollers mounted on a rotatable carrier or endless belt, the delivery end of the tube being free to expand to act as an expansion chamber to ensure a continuous supply of spraying liquid to a spray nozzle.

In order to render the apparatus readily portable and suitable for instance for use by the small holder or home gardener the apparatus may be provided with a handle so that it can be readily carried in one hand, a crank handle being provided for operating the roller-carrier by the other hand.

The handle of the apparatus is preferably hollow and the tube from the pump may pass through it.

The operation of the carrier may be effected by power through reduction gearing from the power take off shaft of a tractor.

In the accompanying drawings:-

Figures 1 to 5 illustrate an example

of hand operated spraying apparatus adapted to be held in the hand;

Figures 1 and 2 being a side and front elevation respectively and Figures 3 and 4 respectively cross-sections on lines 3-3 and 4-4 Figure 1;

Figure 5 is a sectional side view of the spray nozzle fitting;

Figure 6 is a side view of another example of hand operated apparatus to be held in the hand;

In the example illustrated by Figures 1 to 5 a pump casing comprises an approximately D-shaped guide 4 and two side plates 5. These parts are secured together and to a handle 6 by screws 7.

A clip 8 is also secured to these parts by a screw or bolt 9, the clip having a series of holes 10 to enable it to be adjustable.

A flexible tube 11 is laid in the casing, the upper or delivery end being fitted on a metal pipe 12 carried by the clip 8, while the lower part of the tube is passed through the handle 6 which is made hollow for this purpose.

A rotary carrier comprises two discs 13 mounted on a spindle 14 carried in bearings on the side plates 5 and rotated by a crank handle 15.

The carrier discs 13 support a number of rollers 16 free to rotate on spindles 17 which are mounted in holes in the discs. The rollers are spaced apart so as to ensure that at least two are in engagement with the flexible tube 11 at any time.

A spray nozzle 18 is clipped in the outer end of the pipe 12 which is screw threaded to receive a clamping nut 19.

In operation, the end of the tube 11 remote from the pump is inserted in or connected with a suitable container for the liquid to be sprayed. The handle 6

is held in one hand and the crank handle 15 is operated by the other so as to rotate the carrier and bring the rollers 16 successively into engagement with the flexible tube 11.

The rollers 16 squeeze the tube against the frame member or guide 4 closing, or substantially closing, it and thereby lifting the liquid from its container and forcing it out through the spray nozzle 18. The portion of the tube 11 adjacent to the nozzle being free of the side cover plates 5 is free to expand and act as an expansion chamber to maintain a constant pressure so that a continuous spray results.

In order to avoid undue wear of the tube 11 by the rollers 16 it may be provided with a protective covering such as a tape made of hard material in the form of plates linked together to render it flexible.

The rollers 16 may be made of vulcanised rubber, plastic or other material.

The tube 11 may be of reinforced rubber or other material capable of resisting acid such as used in agriculture, or the effect of insecticides.

In the example illustrated by Figure 6 the carrier for the rollers 16 is in the form of an endless belt 20 fitted with bearing brackets 21 for the rollers. The belt 20 runs over pulleys 22, 22 the spindles 23 of which are carried in bearings 24 on the side plates 25 which are secured to a guide 26 which is the equivalent of the guide 4 of the previous example. The side plates 25 are secured to a hollow handle 6 and the upper end of the flexible tube 11 is fitted with a pipe 12 and spray nozzle similarly to the previous example above described.

The spindle 23 of the lower pulley 22 is driven by a crank handle 15.

The apparatus may be driven by power, for instance the side plates of either example described may be secured to a

bracket carried by a tractor drawn, or tractor carried spraying apparatus so that the pump can be driven by the power take off shaft of the tractor.

In such apparatus a number of pumps similar to either example above described may be assembled together and have a common driving shaft which may be driven by power for instance off the power take off shaft of a tractor.

WHAT WE CLAIM IS:-

1. Apparatus for spraying liquids provided with a pump comprising a guide for a flexible tube, which tube is successively squeezed between the guide and at least one of a plurality of spaced apart rollers mounted on a rotatable carrier or endless belt, the delivery end of the tube being free to expand to act as an expansion chamber to ensure a continuous supply of spraying liquid to a spray nozzle. 60
2. An apparatus for spraying liquids according to Claim 1 wherein the pump is mounted on a handle so that it can be held in the hand and the carrier is provided with a hand crank. 65
3. An apparatus for spraying liquids comprising a plurality of pumps according to Claim 1 driven by a common driving shaft. 70
4. An apparatus for spraying liquids constructed and adapted to operate as hereinbefore described with reference to Figures 1 to 5 of the accompanying drawings. 75
5. An apparatus for spraying liquids constructed and adapted to operate as hereinbefore described with reference to Figure 6 of the accompanying drawings. 80

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PROVISIONAL SPECIFICATION

No. 5500 A.D. 1956

Liquid Spraying Apparatus

We, ALLMAN PATENTS LIMITED, a Company organised under the laws of Great Britain, of "Elmstead", Birdham Road, Chichester, in the County of Sussex, do hereby declare this invention to be described in the following statement:-

The invention relates to a pump and spraying device for liquids particularly

for the spraying of insecticides, fungicides, selective weed killers and the like fluids used in agriculture and horticulture, but the application of the device is not so limited as it may be used for spraying light oils, paint and other fluids used in a wide field of varying industries. 100

One aspect of the invention is 105

particularly suitable for the small holder and the so-called "home gardener" who often possesses a small number of fruit trees or soft fruit bushes and who wishes to apply insecticides or the other fluids, but for whom the purchase of a medium capacity spraying machine would be uneconomic. Accordingly it is one object of the present invention in its simplest form to provide a simple manually operable pump and sprayer which is cheap to manufacture and simple to operate.

Another object of the invention is the production of a pump and spray which can spray acids and like corrosive fluids without damage to the pump in the event of the pump not being cleaned immediately after use.

According to the present invention a pump and spraying device comprises a flexible tube successively squeezed along part of its length by spaced members mounted on a carrier and adapted to be brought successively into a position to apply pressure along a length of the tube to force fluid along the tube to a spraying nozzle, a portion of the tube between the spraying nozzle and the last point of pressure of the members acting as an expansion chamber.

In one example of pump and sprayer according to the invention, adapted for manual operation a pump frame consists of an arcuate body portion having screwed to it two D-shaped wing pieces or side covers. A tube of very flexible rubber follows the inside curve of the body portion, at one end protruding from between the side covers at the top of the body and, at the other end, passing through a hollow wooden or metal handle which is secured to the bottom of the body portion.

The portion of tube protruding from the side covers at the top of the body portion extends substantially horizontally for a short distance and is supported by a clip attached to the side covers. (The tube extends substantially horizontally as hereinbefore described when the handle is held in a vertical position.)

Secured to the end of the tube is a spraying nozzle of any known type, preferably of the type providing for interchangeable nozzles of varying aperture.

Carried by the side plates, and mounted in bearings secured to the side plates is the pump rotor axle on which are mounted two spaced discs having pressure rollers equidistantly spaced between them near their rims.

Conveniently three such rollers may be

mounted between the discs, but four or more may be carried. Three such pressure rollers have been found to produce a satisfactory pressure head for spraying.

A crank handle is fastened to one end of the pump rotor axle whereby the two discs, and the pressure rollers mounted thereon, may be rotated. As the discs are rotated they bring successively, into tube squeezing position, the pressure rollers, any one pressure roller engaging the tube near the handle and squeezing the tube against the arcuate body portion, as the disc is rotated, to a point at the top of the body portion near the faces of the side covers. The spacing of the rollers is such that at least two rollers are in a tube squeezing position at any given moment.

In operation, the end of the tube remote from the pump is dipped into or connected to the fluid supply and the operator, who holds the pump by the handle in one hand, turns the crank handle with the other hand.

The pressure rollers squeeze along the tube, squeezing the tube against the arcuate body portion of the pump and closing or substantially closing the bore of the tube, creating a vacuum, and thereby lifting the fluid from its source or container into the tube. As each pressure roller squeezes the tube, in the rollers' circular path, fluid is compressed within the tube, and that part of the tube, which protrudes from the side covers and terminates in the spraying nozzle, acts as an expansion chamber, distending under the pressure of the fluid and maintaining a constant pressure head behind the spraying nozzle so that a continuous spray results.

In a modification of the example described above, a tape may be fitted on top of the tube within the body portion so that wear on the tube by the passage of the pressure rollers may be minimised. Such a tape may be made of metal links capable of resilient relative movement one to the other; alternatively, any suitable resilient material may be utilised for the tape.

In another example of the invention, the pump is identical with that described, but without either the handle or the crank handle, and is mounted on a framework. The pump rotor in this example is adapted to be driven, preferably through a reduction gear box, from the power take off shaft of a tractor.

Likewise a number of pumps, with a common rotor shaft may be so driven from the power take off shaft of a tractor.

The pump according to the invention is particularly suitable for acid spraying since no metallic parts come into contact with the acid and consequently
5 no corrosive action results. Acid resistant rubber tubing should, of course, be used in such spraying.

The tubing may be made of a suitable plastic instead of rubber and the
10 pressure rollers may be made of any suitable material, such as hard rubber. To minimise wear on the tube it is desirable that the pressure rollers can rotate as they squeeze their way
15 along the tube.

As a further modification, the

pressure rollers may be mounted on a small belt adapted to run over two pulleys, one or both of which would be, manually or mechanically driven. In
20 such a modification the body portion of the pump would be shaped to run parallel with the belt for that portion of the tube in which squeezing took place. 25

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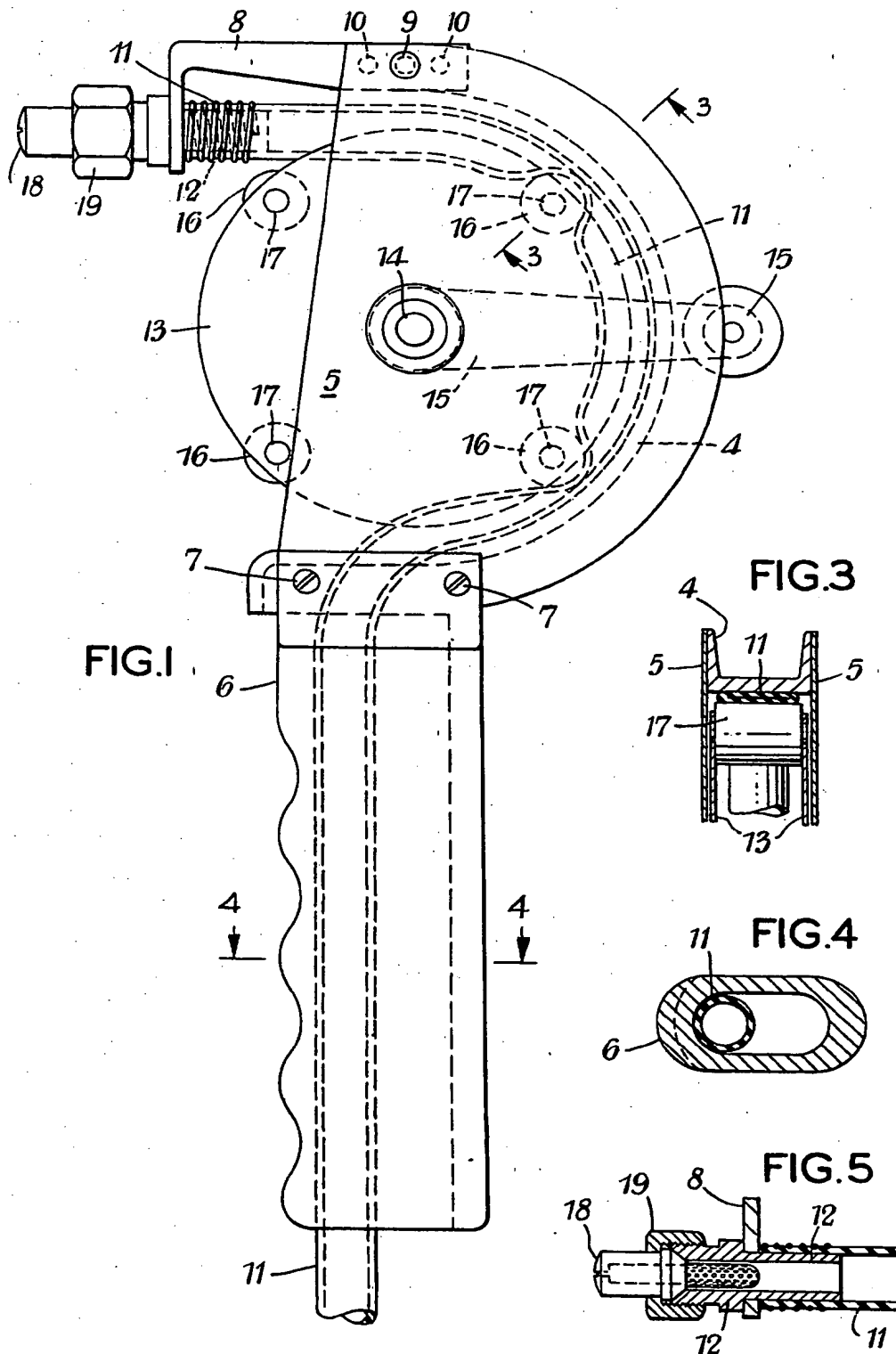
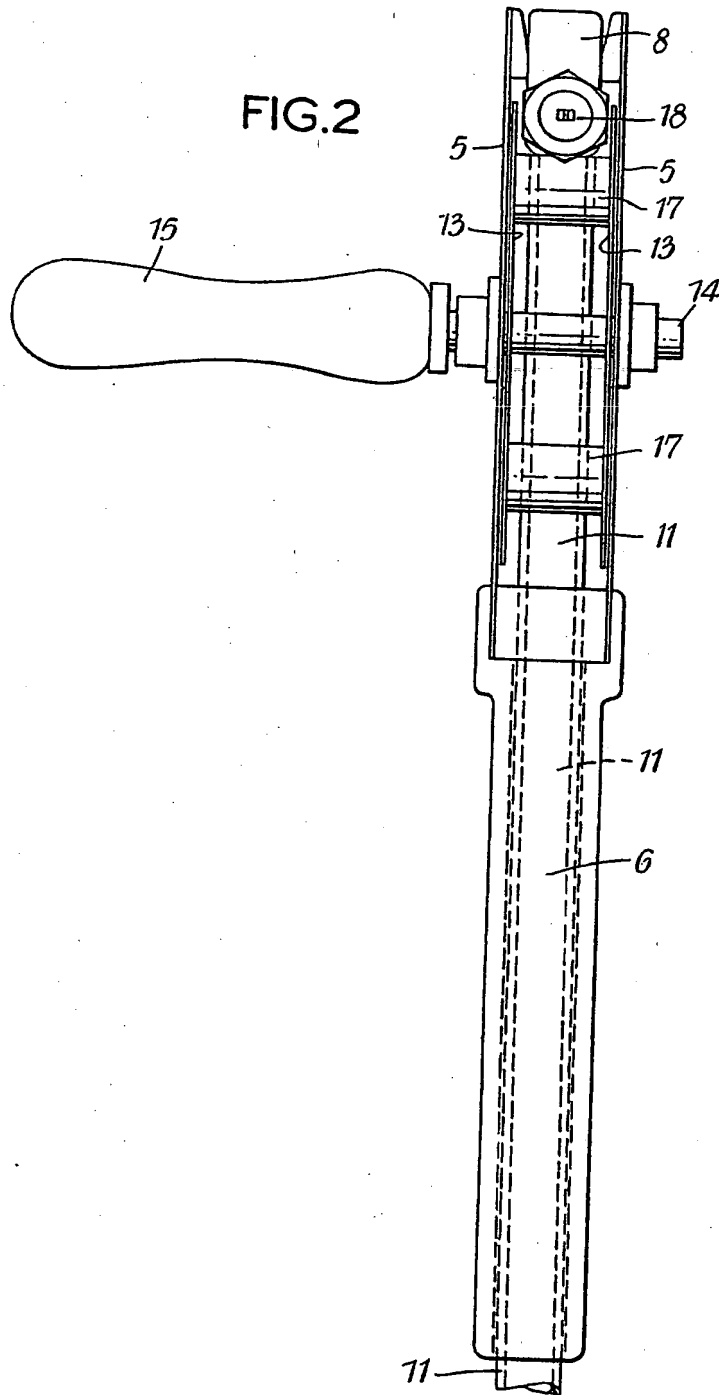


FIG.2



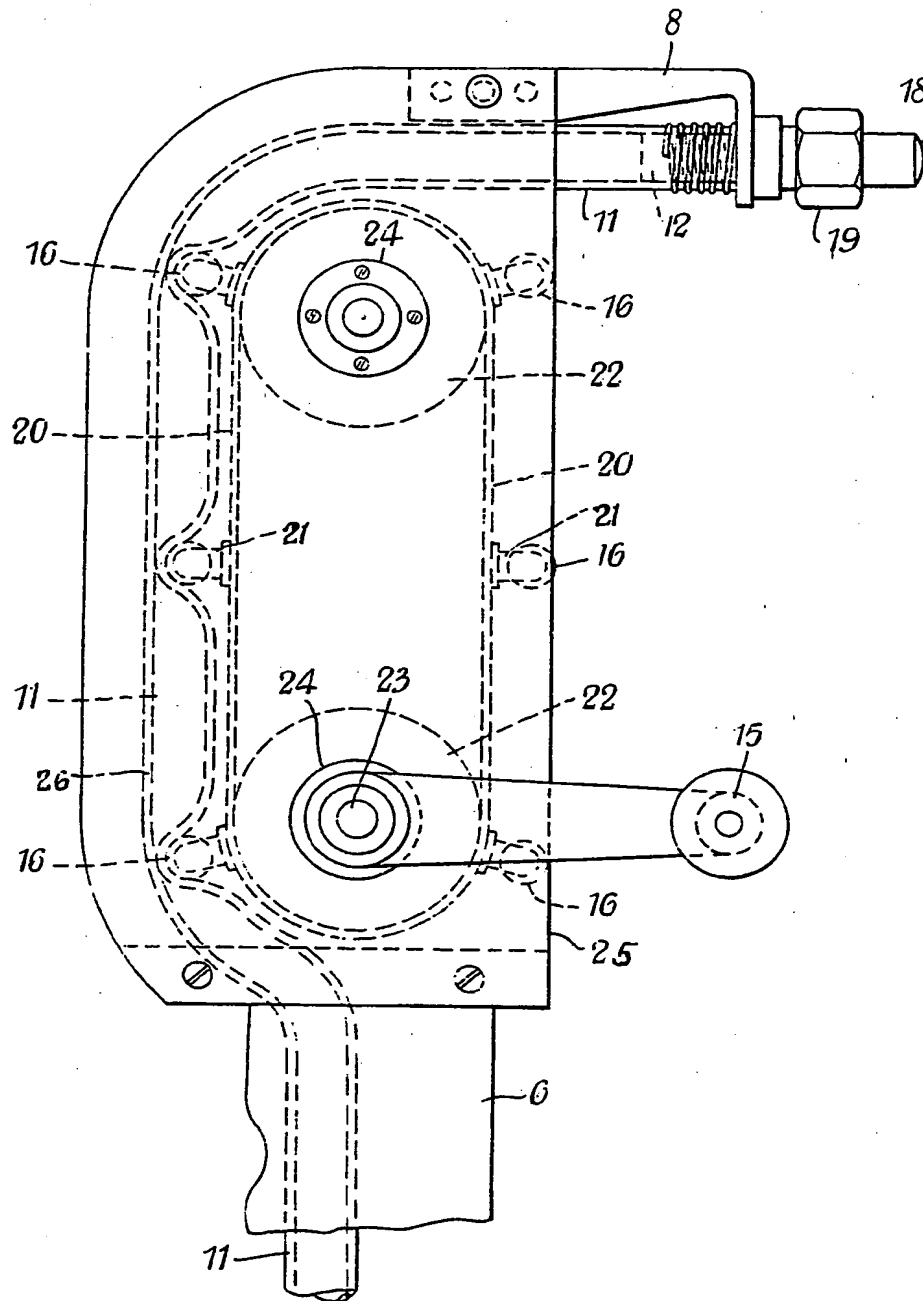
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COMPLETE SPECIFICATION

3 SHEETS

*This drawing is a reproduction of
the Original on a reduced scale.
Sheets 2 & 3*

FIG.6



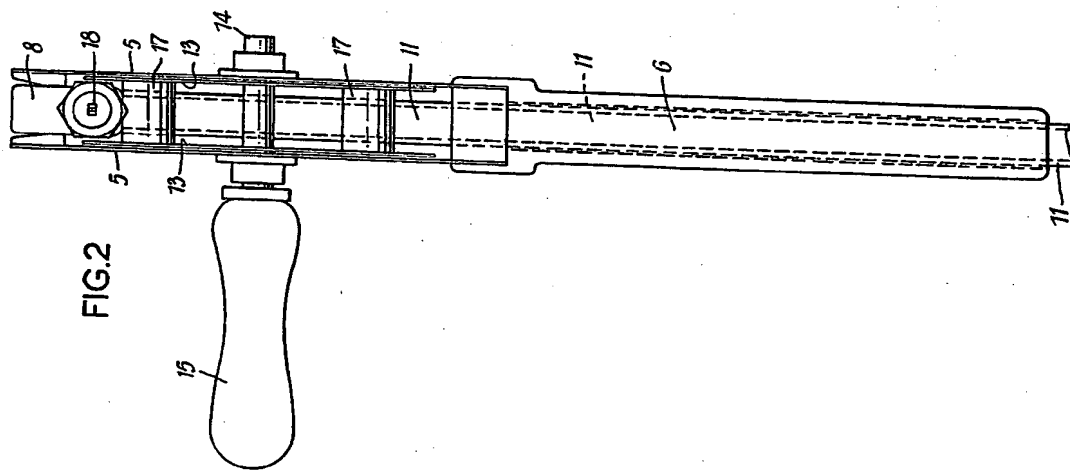


FIG. 2

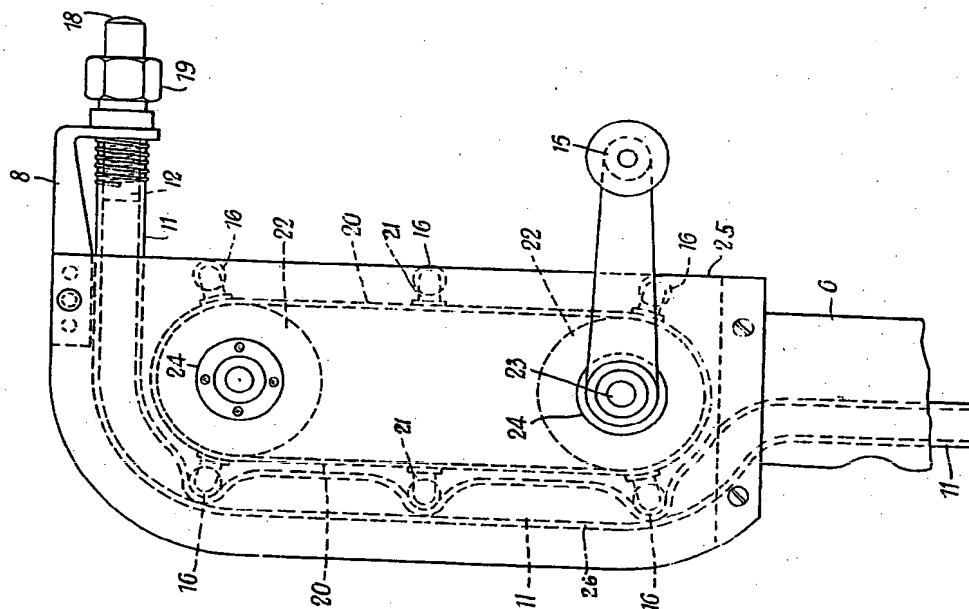


FIG. 6